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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,432	09/19/2001	Tatsuya Maruo	0171-0784P-SP	9441
2292	7590	09/08/2005	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			WALKER, KEITH D	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	09/955,432		MARUO ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Keith Walker		1745	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7-9, 11-14 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) 13-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-9, 11-14 and 16-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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## **DETAILED ACTION**

### ***Summary***

Claims 7-9, 11-14 and 16-20 are pending in the application and Claims 13-17 are withdrawn from consideration as being drawn to non-elected subject matter.

### ***Information Disclosure Statement***

1. The information disclosure statement filed on February 28, 2005 has been placed in the application file and the information referred to therein has been considered as to the merits.

### ***Claim Objections***

2. Claim 7 is objected to because of the following informalities: "flouropolymer" should be "fluoropolymer". Appropriate correction is required.
3. Claims 11, 16 & 20 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to the other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. Claims 7-9 & 18-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter

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which applicant regards as the invention. The meaning of residue is unclear as a limitation and is unsupported by the specification.

6. Claims 7-9 & 18-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what class is defined by the list of fluoropolymer, synthetic rubber, polyolefin and polyether.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-9, 11-12 & 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venugopal et al., US Patent 5,558,959 for essentially reasons of record.

Venugopal et al. disclose polyurethane gel electrolyte systems. The electrolyte system includes an organic support structure and a liquid electrolyte absorbed by the organic support structure, (column 3, line 10) and is disposed between the anode and the cathode. (See Fig. 1). The electrolyte is therefore used as a separator. The organic support structure may be a segmented block copolymer. An example of an inventive block copolymer is a polyurethane thermoplastic which is a copolymer of a short-chain diisocyanate and a polyester diol. (Column 3, lines 8-44.) An example of polyester diol

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usable in the invention is polycaprolactone, which corresponds to applicants' formula (1). (See Venugopal et al. column 4, lines 18-29 and Chemical Abstracts RN 25248-42-4.) Further, the limitation addressing the preparation of the polyurethane in claim 20 is seen as a product-by-process and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. "The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (MPEP 2113)

The polyurethane/liquid electrolyte system disclosed by Venugopal et al. may be mixed with cathode powders to form composite cathodes. (See column 6, lines 51-63.) Since the liquid electrolyte has been absorbed by the polyurethane support structure, cathode powder is effectively mixed with a gel material containing a polyurethane polymer and a liquid electrolyte. The mixture of cathode powder and electrolyte gel forms a "composite cathode", and in such situations the polymer electrolyte can act as the active material binder. As evidence, see the discussion by Lamanna et al., US Patent 5,652,072, column 6, lines 47-61.)

The block copolymer used for the electrode can be a combination of polyurethane and polyester (column 6, lines 18-22).

In a preferred embodiment, a film containing 0.5 grams of polyester/polyurethane resin, and 2.0 g of a 1M solution of electrolyte described. (See column 7, Example 1.) Thus, a solution containing 20 wt% resin is described.

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In a preferred embodiment, Venugopal et al. disclose forming a polyurethane film by compression molding, and subsequently soaking the film in a 1 M solution of lithium tetrafluoroborate dissolved in propylene carbonate. This process clearly swells the polyurethane film. (See column 8, lines 15-26.)

The disclosure of Venugopal et al. differs from applicants' invention in that Venugopal et al. do not recite a specific amount of swelling which occurs after 24 hours. Venugopal et al. describe the swelling occurring after soaking a specific embodiment for 48 hours instead. Venugopal et al. describe an inventive polyurethane film soaked for 48 hours to contain about 63% liquid electrolyte. (Column 8, lines 20-22.) Therefore, 37% of the soaked film is polyurethane, and is the original weight of the film. The swelling ratio after 48 hours is  $100/37 \times 100$  or about 270%.

Venugopal et al. note that with increasing wt% of the liquid electrolyte material (in the gel electrolyte) the conductivity similarly increases. Thus, the swelling ratio of polyurethane film is a result effective variable, and it would be within the skill of the ordinary artisan to adjust the amount of swelling of the polyurethane film which occurs in 24 hours in order to adjust conductivity of the film.

With regards to claims 18 and 19, Venugopal et al. describe an electrolyte system using a block copolymer containing polycaprolactone, which corresponds to applicants' formula (1) with the exception that the number of repeating units in the polymer segment are not mentioned. (See Venugopal et al., column 4, lines 18-29.) However, Venugopal et al. suggest polyester diol segments with relatively high molecular weights should be used. (Column 4, lines 10-14.) One of ordinary skill in the

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ad would interpret this teaching to include polymer segments with more than 5 repeating units.

Claims 7-9 & 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venugopal et al., US Patent 5,558,959 in view of Katsurao et al., US patent 6,372,388.

As discussed above, Venugopal et al. disclose applicants' invention essentially as claimed with the exception that Venugopal et al. do not include fluoropolymers as binder thermoplastic resins. Katsurao et al. discloses blending a polyvinylidene fluoride copolymer or a mixture of a polyvinylidene fluoride and another resin with an organic solvent and a powdery electrode material to form an electrode. (See column 6, line 60-column 7, line 4.) The polyvinylidene fluoride is thus a binder material. The electrolytes used include ethylene carbonate, diethyl carbonate, dimethyl carbonate, propylene carbonate and combinations thereof (Venugopal et al. column 3, lines 15-35). The mixture for the electrolyte would have a freezing temperature above the glass transition temperature of the vinylidene fluoride.

The vinylidene fluoride material is taught to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries. (See column 16, lines 35-47.) Thus, it would have been obvious to one of ordinary skill in the art to include the polyvinylidene fluoride material taught by Katsurao et al. in order to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries taught by Venugopal et al.

***Response to Arguments***

8. Applicant's arguments with respect to claims 7-9, 11-12 & 18-20 have been considered but are moot in view of the new ground(s) of rejection. Applicants argue a combination of a thermoplastic and at least one other thermoplastic resin is needed. As stated above, Venugopal et al teaches a binder made by combining a polyurethane with a polyether.

9. Applicant's arguments have been fully considered but they are not persuasive. Applicant argues that the addition of the polyvinylidene fluoride of Katsurao et al. to the thermoplastic binder of Venugopal et al. instills a high temperature resistance property. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability. An improvement in high temperature resistance does not detract from the teaching of adding the polyvinylidene fluoride to improve the retentivity of the powdery electrode materials and the ionic conductivity. The material characteristics of polyvinylidene fluoride allow the glass transition temperature to be less than the freezing temperature of the electrolyte as presented above.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KW

  
PATRICK JOSEPH RYAN  
SUPERVISORY PATENT EXAMINER